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ABSTRACT

Four models for teaching students how to interact more effectively with text at the junior high, high school, and university levels are reviewed in this paper. Each model emphasizes one or more of the following classroom components and their interactions--student resources, text characteristics, tests or course goals, and instructional strategies. Statements of purpose, specific objectives of the program, installation procedures, and evaluation methods and results are provided for each of the models described. Results indicate that all four models were successful in some ways. Each had in common a long time duration; this time requirement is necessary because instructors need the time to learn how to comprehend and incorporate the instructional models' complex components into their instruction and students need the time to acquire, habituate, and use instructional strategies for learning from text. (HOD)

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Technical Report No. 8

Models for Teaching Teachers How to Teach Students to Learn from Text at the Junior High, High School, and University Levels

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Conference Proceedings. (These are available from the Educational Resources Information Center, 1111 Kenyon Road, Urbana, IL 61801. ERIC retrieval numbers are listed after each reference.)

1. Harry Singer and Thomas W. Bean (Eds.). Proceedings of the Lake Arrowhead Conference on Learning From Text, April 14-16, 1982. University of California, Riverside, Riverside, CAlifornia: Learning From Text Project, 1982. ERIC Retrieval No. ED 222 860.

2. Harry Singer and Thomas W. Bean (Eds.). Learning From Text Project: Conceptualization, Prediction and Intervention. Final Report, University of California, Riverside, CA: Learning From Text Project, 1982. ERIC Retrieval No. 223 989.

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Models for Teaching Teachers How to Teach Students to Learn from Text at the Junior High, High School, and University Levels

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Learning from text has been defined as construction of meaning that results from an interaction between a reader's resources and a text's features (Goodman, 1984; Singer, 1983; Tierney & Pearson, 1982). This definition assumes that only two parties are involved in the interaction: the student and the text.

However, a third party often affects this interaction in a variety of ways. The classroom teacher can establish purposes and goals to be achieved in learning from text, instruct students in strategies for reaching these goals, devise tests that determine whether the goals have been reached and feed this information back to the students (Singer & Bean 1982a,b, 1983). The teacher also plays a role in the selection of text(s) for the class, and can choose texts that are friendly, that is, written in such a way that they facilitate comprehension (Singer, in press).

Even if a text is friendly, it is not likely to fit all students in a class because of the wide range of individual differences that exist in any class. If a heterogenous group of students progresses

through the grades we can expect its range of reading achievement in reading age equivalents will increase from four years at grade 1 to twelve years at grade 12. The general formula is that the range of reading age equivalents in a heterogeneous class is two-thirds of the median age of the group.

Fortunately, strategies are available for handling the wide range of individual differences in ability to learn from text. These strategies fall into two major categories: single text and multiple text strategies. For explanation and applications of these strategies, see Singer and Donlan (1980).

Thus, the ability to learn from text in a classroom setting has all the components depicted in the instructional model, shown in Figure 1. The model indicates that students interact with a text to achieve a goal, often in the form of a test. The instructor interacts with all three components: an instructor can teach students how to learn from a friendly text or else the instructor can modify the text to make it friendlier, for example, the instructor can add marginal glosses, devise reading guides, use graphic organizers, insert questions, and provide metadiscourse to the text. The instructor also defines the goals and constructs tests to determine whether students have attained these goals. Thus, learning from text in a classroom setting can be defined as an interaction among all the components in

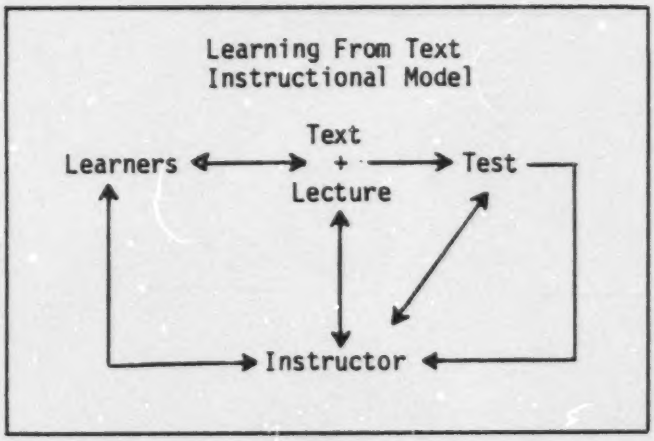


Fig 1. Instructional Model for Learning from Text showing interrelations among the model's major components. Coherence occurs in the model when the instructor's objectives, learning abilities, purposes, materials (text or lecture) for satisfying these purposes and the test for assessing them are in agreement. The model shows that the instructor also influences the other three components and they in turn influence the instructor.

our instructional model. One of the hypotheses we have been testing is that achievement in a classroom setting is likely to be highest when there is coherence among all the components depicted in our instructional model (Singer & Bean, 1982a,b).

In the four models, described below, we emphasize one or more of these components. However, each model demonstrates a somewhat different approach to instructional improvement. Although our explanation of each model is brief, we have nevertheless tried to provide enough information to make it possible to duplicate our approaches.

Intern Model

The purpose of our intern model for training content reading specialists was to investigate experimentally whether teachers who were committed and trained to teach reading in the content areas at the junior high school level would improve the reading performance of all their students, including Mexican-Americans and Blacks (Singer, 1973). Furthermore, we wanted our specialists to demonstrate that they could teach heterogeneous groups of students in regular content area classrooms and texts without the tracking or achievement subgrouping of students that has been associated with stigmatization of students and tends to be counterproductive to their achievement. We anticipated that if the content reading specialists succeeded in teaching their own classes to learn from text, they would gain credibility with their colleagues and be more acceptable in their

consultant role of teaching them how to teach their students to learn from text.

This program contrasts with those that expect students to learn how to read and how to learn from texts in developmental reading classes in elementary school or in special reading classes, reading laboratories, or pull-out type classes in junior high school and then transfer and apply these skills on their own to all their content area classes. Our assumption was that teachers who were most knowledgeable about the content of texts and knew how to teach students to learn from text would be the persons best able to teach students how to learn that content from the text. Students would then learn how to learn from texts in specific content areas, and therefore would not have to transfer their training from a general learning from text class to each of their content area classes. We know from numerous research studies that transfer of training does not have a high probability of occurrence. Therefore, it is preferable to teach something directly, if possible, rather than rely on transfer of training.

Another contrast is that instead of full-time consultants who are located in a central office, our reading specialists would serve in their schools as teachers for two-thirds of the day and be available as consultants for one-third of their time. They would therefore be knowledgeable about the school, staff, and students; hence, they would be able to consult with full knowledge of the situation; in turn, their faculties would get to know our reading specialists, have

opportunities to see them demonstrate how to teach students, the very same students they had in their own classes, how to learn from their content area texts. Thus, our content reading specialists would combine expertise in their content areas with learning from text knowledge and methods, teach their own students, and disseminate their expertise as consultants to their own faculties.

Specific Objectives of the Program

1. To improve the reading achievement of junior high students, particularly those who are eduationally disadvantaged. The intent was to attain statistical convergence in the achievement of Anglo and ethnic minority groups and, in general, to improve the average level of reading achievement in the junior high school.

2. To prepare reading specialists for the junior high school. These specialists were to learn to diagnose and remedy reading difficulties through course work and a year-long internship under supervision.

3. To spread the effects of the reading specialist to all teachers in the junior high school through consultative and in-service training in teaching reading in the content areas. The purpose of the consultation with individual teachers was to ameliorate the reading abilities of students, have the classroom teacher become aware of reading difficulties in the content areas, and learn ways of overcoming such difficulties. The teacher could then incorporate such knowledge into classroom practices that would be beneficial to all students in the class.

4. To improve the junior high school curriculum. The program presumed that improved competence in the teacher's subject field would increase his or her awareness of instructional options while engaged in the process of curriculum decision-making. Thus the course work in a specific content area was intended to work as a vehicle for helping the teacher improve the curriculum in his or her field.

5. To develop model classrooms in the junior high school. It was expected that each of the content reading specialists would develop a model classroom for the improvement of reading in his respective content areas, e.g., science, social studies, English, etc. Development of these classrooms was viewed as a central objective of the entire project.

Installing the Program in Junior High Schools

After a year of course work at the University, the reading content specialists began their intern year. Two interns were placed in each of four junior high schools in California: Riverside Unified School District (two) and San Bernardino Unified School District (two). In San Bernardino the schools were brand new. Principals in both school districts had volunteered their schools for this phase of the program.

To launch the program in the schools, a one day conference with department chairman in science, social studies, mathematics, and English, and principals of the four schools was called in May of the first year. In the morning, a consultant to our project, Dr. Harold Herber, Syracuse University, taught the participants the use of

reading and reasoning guides and showed films on use of these guides in actual classroom settings. In the afternoon, the Content Reading Specialists served as consultants to the department chairmen and principals organized into content area groups. Each group had been given the task of constructing reading and reasoning guides to accompany textbook assignments and teach students processes and content in the assigned material. This Conference set the stage for the second year when the Content Reading Specialists would serve as teachers and teacher-consultants in the schools represented at the Conference. It also initiated and gave confidence to the Content Reading Specialists in their roles as consultants.

General Procedures

Four major approaches were used in teaching reading in the content areas to heterogeneous classes of seventh graders and a few classes of eighth graders. These approaches were:

(1) construction of units based on the project or theme method. This method utilizes a range of reading material encompassing all the reading ability levels in a classroom; the Scholastic Magazine's unit on "Courage" is an example of the project method;

(2) reading and reasoning guides (Herber, 1968) were emphasized in each content area with an extension made by our program to include word recognition and word meaning instruction;

(3) Moffett's (1968) techniques were stressed in English classes: group discussions were held, reading was taught through writing activities, journals were kept, paperbacks were used in self-selection

and free reading time, role playing and class plays were also utilized;

(4) cross ability teaching was employed, sometimes in group settings and other times in one-to-one relationships.

The Content Reading Specialists also spent one-third of their day consulting with other teachers. This consultation included such activities as teaching the use of study guides, working with small groups, and demonstrating reading instruction in the content areas to an entire class and its teacher. To encourage teachers to consult and to provide the means for curriculum modification, each junior high school was given $2500 for purchase of materials and supplies. Purchase decisions were to grow out of consultation between teachers and the Reading Content Specialists.[3]

Data

To determine whether our project had improved students' achievement, data were gathered in the Content Reading Specialists' classes and in control group classes. The control group classes consisted of teachers who volunteered to have their classes tested in the fall and retested eight months later in May. It was not feasible to use the most defensible design of random assignment of students to experimental and control group treatment.

Three test batteries were used for gathering data: (1) California Reading Achievement Test, Junior High School Level, Forms W and X, (2) Carter's California Study Methods Test,[4] and (3) Athey-Holmes Reading Personality Scale (1969).

Results

While the test results were statistically insignificant, the project did succeed in demonstrating that it was possible for content reading specialists to teach a class of junior high school pupils without tracking students or subdividing them into groups of high, average, and low reading achievers, which some teachers believe is necessary for effective instruction. In a school district consisting of about six percent Black, 12 percent Chicano, and 82 percent Anglo students, our heterogeneously grouped classes showed no relative loss in reading achievement when compared with more homogeneously grouped classes.

Evaluation

Our intern program was effective. The reading content specialists successfully achieved one of their purposes: to establish demonstration classrooms. For example, after visiting one of the demonstration classrooms a teacher explained that he had used his free period to find out how the content reading specialist "gets more out of these kids than I do."

The consultant role of the content reading specialists was also successful, but only after two thirds of a school year had gone by. Apparently it took that long for the content reading specialists to demonstrate in their own classrooms, gain credibility as specialists, and develop rapport with their respective faculties. Their dissemination procedures were diverse: helping with problem readers, working with small groups in the teacher's class, and conversations

held in the teachers' lounges. Gradually they began to teach the teachers how to teach the entire class to learn from text. In this role, they were very effective. For example, the outside evaluator of the project, Dr. Robert Ruddell, University of California, Berkeley, heard in an interview one faculty member laud what he had learned from the content reading specialist in his school. This faculty member who was the incoming president of the city's teachers association stated that during his presidential year he was going to visit all the schools in the city and explain to the faculties how to teach students to learn from text.[5]

Institutionalization of the Project

The project also had a significant impact on our program in training reading content specialists at the University of California, Riverside. We now have all our students who are preparing to be reading specialists go through the following sequence of courses, divided into two stages. The first stage is a four course Concentration for Classroom Instruction that has options for either a writing or a reading emphasis:

1. Introduction to reading (teaching students how to read)
2. Teaching Writing in the Content Areas or Reading in the Content Areas
3. Curriculum in Writing or Reading in the Content Areas
4. Problems in Teaching Writing or Reading in the Content Areas (a practicum, consisting of a seminar plus 90 hours of instruction in public school classes under supervision)

The second stage consists of a master's degree that is divided into four groups of courses:

1. A year long sequence consisting of three courses in theory, diagnosis, and improvement of reading and learning from text, plus a course in learning theory.
2. Two courses in curriculum and instructional strategies, plus a course in teaching children's and adolescent's literature.
3. Three courses for evaluation and critical reading of research: statistics or research design, tests and measurements, and review of the research literature in reading that includes doing a minor research paper.
4. An internship for one quarter that involves a seminar and experience in supervising beginning reading teachers.

Based on our experience with our intern program, we wrote a textbook for teaching students how to read and learn from text that is now used in our course on Reading in the Content Areas (Singer & Donlan, 1980). The text explains five single and three multiple text strategies for meeting the wide range of individual differences that exists in any heterogeneous class, a range that expands from four years in reading-age equivalents in grade one to 12 years in grade 12. These strategies enable teachers to teach all students to learn the content of their texts without stigmatizing any student.

Some 45 content reading specialists have completed the program and are now serving as reading specialists in elementary, junior high, and senior high schools throughout southern California. Ideally we

would like those who are content reading specialists in junior or senior high schools teach their own classes for at least one period a day, direct content reading acquisition classes or laboratories for one or two periods, diagnose students and advise them and their parents for one period a day, and consult or provide inservice training with the faculty members one period a day.

Thus, our extramurally funded, U. S. Office of Education Educational Personnel Development Act (EPDA) project provided seed-money that led us to establish what has evolved into our current program for preparing content reading specialists.

Inservice Model

Throughout the country, intensive, long-range inservice programs on learning from text are replacing brief, "one-shot" efforts. This is certainly the case in the Anaheim Union High School District. We are currently in the third year of a large, district-wide inservice project involving a group of 30 well-informed content area teachers, reading specialists, and administrators. These project members collaborate in the planning and implementation of school and department level inservice for their colleagues, potentially influencing hundreds of additional teachers and students. In this section we outline the Anaheim inservice model, one that could be adapted to the context of similar urban districts.

Purpose

Initial planning for a district-wide effort in learning from text began in the Spring of 1982. Not surprisingly, the impetus for such

an effort grew out of falling test scores. A series of planning sessions involving the Assistant Superintendent, Curriculum Director, Reading Specialists, Content Representatives, and the second author, resulted in the following four year model.

We wanted to provide content area teachers at the junior and senior high levels with an array of learning from text strategies (e.g. Singer & Donlan, 1980; Readence, Bean, & Baldwin, 1981). These strategies, in the broad areas of vocabulary and comprehension, would help students read and respond to challenging content area assignments.

One of the assumptions that guided us in the planning stages was the need for teachers to directly experience learning from text strategies. This assumption suggested that a small group approach would be most appropriate.

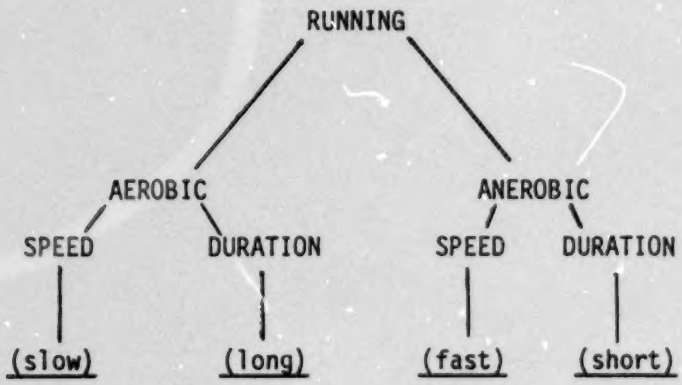
District funding provided support for two week half day summer workshop sessions starting in mid-June. Teachers participating would be paid a stipend and, during the coming year, they would have some released time to work with colleagues and orchestrate workshops for faculty. During the summer of 1982, a group of 15 junior high content teachers met with the second author and three district reading specialists. These teachers represented six schools and over 12 different content areas.

Our overall objective in the workshop was to develop a resource handbook of sample lessons exemplifying vocabulary and comprehension strategies. These handbooks would be used during the regular academic year in staff development sessions.

Week one of the workshop focused on prereading and postreading strategies in the area of technical vocabulary. Participants considered strategies such as graphic organizers and categorization introduced in contemporary content reading texts. During week two, comprehension strategies were considered including anticipation/reaction guides and selective reading and study guides.

The workshop format followed our assumption that teachers need to actively experience and experiment with a new strategy. Thus, the following four steps were integral to this process of assimilating a new strategy.

1. Each instructional strategy was introduced through a simulation lesson and walk-through of the strategy purpose and steps. For example, the second author might introduce graphic organizers by discussing a general topic such as running with reference to a pre-reading postreading organizer like the following:



Participants were instructed to read to identify the speed and duration differences in these two contrasting forms of running. Then they would insert the information into the blank spaces in the postreading organizer (as shown in the parentheses). Prior to this particular strategy various patterns of organization in text were considered with reference to the teachers' material.

2. Following the simulation, workshop participants met in small groups clustered by content areas. They used a handout summarizing strategy steps to create an example lesson in their own content material.

3. Workshop participants then gave their lesson a "trial run" by teaching it to a colleague from a different content area (e.g. Industrial Education, Science or Social Science).

4. The edited example lesson plan then became part of the handbook with appropriate author credits. The following sample lesson illustrates this step (Rayl, 1983).

NAME OF STRATEGY

ANTICIPATION GUIDE

SUBJECT AREA

PHYSICAL EDUCATION

(Stretching)

SOURCE (TEXT AND CHAPTER PAGES)

Hayes, Ash. Fit To Be You. (Series of Three Films) San Diego, California: Walt Disney Educational Media Company, 1981. (Twelve minutes each)

PURPOSE

To challenge or support students' current beliefs about a content topic. Group the statements into three levels of: 1) textually explicit (literal or factual), 2) textually implicit (interpretation or inferencing), 3) experiential (application or problem-solving).

STEPS

1. Identify the major concepts and supporting details in text handouts, lecture, and film.

2. Identify students' experiences and beliefs that will be challenged.

3. Create statements that reflect your students' pre-discussion notions or beliefs.

Examples:

BEFORE Yes/No	AFTER Yes/No	Level 1
_____	_____	1. When stretching it is helpful to use bouncing movements.
_____	_____	2. Muscles used during vigorous activity should be stretched after the activity also.
_____	_____	3. Tightening the antagonistic muscle group will help relax the muscles being stretched.
_____	_____	4. 5 to 10 seconds is enough time to achieve flexibility in a joint.

BEFORE Yes/No	AFTER Yes/No	
		Level 2
____	____	1. Stretching is not necessary in hot weather.
____	____	2. If you want to stay loose, don't lift weights.
____	____	3. Tight ligaments, tendons, and muscles are less susceptible to strain or tearing.
____	____	4. The only value to stretching is reduction of injuries.
		Level 3
____	____	1. Most doctors prescribe stretching for relief of tension and stress.
____	____	2. A gymnast and a football player should stretch about the same length of time.
____	____	3. Stretching is neglected because it is painful and boring
____	____	4. Stretching with the aid of a partner can bring about greater flexibility.

(Take Home Term)

Proprioceptive Neuromuscular Facilitation

The handbooks are distributed to faculty thoughout the district during the first week of class. They are used in school and department level staff development sessions scheduled throughout the year with assistance from the members of our project team.

Evaluating the Project

Early in the planning stages we decided to use a long-range evaluation process with the following three components: 1) summmer workshop evaluation of individual strategies introduced; 2) department and school evaluation of dissemination workshop strategies; and, 3) classroom level observation and interviews with teachers and students. At this stage of the project we can comment on the first evaluation component which has served as a guide in devising department and school level workshops.

1982 and 1983 Summer Workshops

During the first summer, 10 junior high content teachers explored 12 vocabulary and comprehension strategies. At the close of each of the week long sessions, they rated each strategy using a 5 point semantic differential gauging how applicable they felt a particular strategy might be in their content area. For example:

Graphic Organizers are:

applicable _____ not applicable

In planning department and school staff development for the coming year, we focused on the top three ranked strategies our summer participants selected. Table 1 provides the top three vocabulary strategies our junior high group planned to use in their classes.

Table 1

Rank Order of Vocabulary Strategies

Rank	Strategy	Mean Score
1.	Preview in Context	4.60
2.	Graphic Organizers	4.60
3.	List-Group Label	4.20

The first strategy, preview in context, is a pre-reading introduction using four to six important vocabulary words (Readence, Bean, & Baldwin, 1981). Students use the surrounding sentence context to predict possible definitions. Since technical vocabulary is an integral part of all content areas, this strategy was particularly applicable for all our participants. Similarly, graphic organizers are useful for guiding pre and postreading stages. Moreover, they can be applied by students as an independent study strategy (Bean, Singer, Sorter, & Frazee, 1983). List-Group-Label is a logical postreading extension of the first two strategies since it involves categorization of technical terms (Bean, Ryan, & Inabinette, 1983). Comprehension strategies viewed most positively by our junior high group are presented in Table 2.

Table 2

Rank Order of Comprehension Strategies

Rank	Strategy	Mean Rating
1.	Anticipation-Reaction Guides	4.60
2.	Directed Listening Lesson	4.50
3.	Study Guide Questions	4.20

Anticipation/Reaction Guides are relatively easy to develop. They consist of statements that challenge students' thinking about text, film, or lecture concepts (Readence, Bean, & Baldwin, 1981). Hence, they are readily adaptable to a variety of instructional contexts. Similarly, directed listening lessons and study guides, while taking more teacher time to develop, provide good pre and postreading guidance.

During the summer of 1983, 10th and 11th grade teachers from various content areas explored and evaluated a number of vocabulary and comprehension strategies. Their top three strategies closely parallel those preferred by our junior high group. Table 3 shows the vocabulary rankings for this group and Table 4 displays their comprehension preferences.

Table 3

Rank Order of Vocabulary Strategies

Rank	Strategy	Mean Rating
1.	Graphic Organizers	5.00
2.	List-Group-Label	4.84
3.	Preview in Context	4.30

Table 4

Rank Order of Comprehension Strategies

Rank	Strategy	Mean Rating
1.	Anticipation-Reaction Guides	4.30
2.	Selective Reading Guides	4.00
3.	Study Guide Questions	3.92

These summer evaluations have been extremely helpful in devising workshop sessions for department and school faculty. Workshop sessions during the regular year rarely span more than a single day. Based on the summer evaluations, we have been introducing teachers to

broadly based strategies such as graphic organizers and guide material. It is now possible to see many of these strategies becoming part of our content teachers repertoire although we have not yet collected systematic observation and interview data. Slowly but surely learning from text is becoming part of the culture of the Anaheim district teachers. This cultural diffusion model, requiring at least three or four years, is a major improvement on the "one shot" inservice model attempted by many districts in the past. Yet there are other, smaller scale approaches to staff development that are equally powerful. In the following section we describe an "evolutionary" project initiated at the individual teacher, classroom level. This "inside out" strategy involves the teacher intensively in the planning, development, and applied research stages of learning from text. A recent synthesis of learning from text strategies emphasizes the active role teachers played in studies that successfully influenced students' comprehension of social studies text (Wade, 1983).

Evolutionary Model

In order to evaluate selected learning from text strategies in a systematic fashion, we devised a three year applied research project. Then we set out to find a teacher to collaborate with us. We wanted to work with a teacher and a school that had not been inundated with a vast amount of staff development in learning from text. Mr. Don Carlos, a Curriculum Coordinator friend in the Garden Grove District introduced us to Mr. Jack Sorter, an outstanding history teacher at Garden Grove High School.

In a series of planning meetings with Jack, we read and discussed much of the available work on metacognitive strategies in summarization and graphic organizer construction. Based on these discussions we designed a series of applied studies. In the most recent study completed, we were able to show that students taught how to construct their own graphic organizers of world history concepts significantly outperformed their peers using a traditional outlining approach (Bean, Singer, Sorter, & Frazee, 1983). In addition, students in the graphic organizer group were better able to reconstruct ideas from poorly structured text in order to write a succinct, well formed summary.

These data-based findings are important as are the serendipitous hints about staff development that emerged as we collaborated with Jack. For example, we began with a procedure for constructing graphic organizers that Jack Sorter modified to better reflect the specific structure of world history text. He instructed students to place background information from their reading on the left side of the graphic organizer, major events in the middle, and results of these events on the right side. This concrete structure helped students use graphic organizers in a fashion that would not have been readily apparent to a reading professor. More recently, Jack has begun using students' graphic organizers as a basis for making predictions about oncoming events in world history text. Indeed, he is effectively overcoming one of the major pitfalls of most content area texts: cursory coverage of a topic that will not be mentioned again in future chapters.

We have learned a great deal working closely with Jack Sorter but the most interesting aspect of this "inside out" approach is the influence Jack has had on his colleagues at Garden Grove High and within the district. This influence has come about not through any top down suggestion that teachers should pay attention to Jack's class and his learning from text approach. Instead, his students have been the "ambassadors."

Toward the end of the first year of our project at Garden Grove (1983), two of Jack's students who were also taking Stan Cowen's biology class found that graphic organizers were helpful in studying difficult sections of the text. Moreover, they shared this study approach with Mr. Cowen who then became interested in learning more about graphic organizers. This year Stan is helping us conduct an applied study in three of his biology classes. More importantly, he is sharing what we are learning via a telecommunications network of science teachers in Orange County.

Teachers need to have a stake in the development of inservice sessions. Both the Anaheim and Garden Grove models share a view of inservice that is collegial. Both acknowledge that learning, whether for teachers or students takes time. Indeed, the best long-range evaluation of this part of UC-CSU Learning from Text Project must await the arrival of these students in our university classes (Singer & Bean, 1982a, 1982b, 1983).

Experimental Model

The University of California (UC) and the California State

University (CSU) systems through its Joint Projects Steering Committee funded the Learning from Text Project. Its purpose was to (1) determine the relationship between learning from text and achievement and (2) demonstate ways of improving ability of students to learn from text.

The first purpose was realized by administering a battery of tests to freshman students at three of the nine UC campuses (Davis, Berkeley, and Riverside) and six of the 19 CSU campuses (Sacramento, San Francisco, Los Angeles, Dominguez Hills, San Bernardino, Fullerton, and San Diego).[6] Student scores on scholastic aptitude test (verbal and mathematical ability) and high school grade point averages (HS GPA), secured from the registrars of each campus, supplemented the tests in our battery. These tests were the Sequential Test of Educational Progress (STEP): Reading, Form 1A (Educational Test Service) and the California Survey of Study Methods (CSSM) (McGraw-Hill/California Test Bureau). CSSM includes three subtests: Attitudes, Planning, and Mechanics of Studying. Step-wise multiple regression of these data revealed that three predictors resulted in a multiple correlation of .43 with first semester college GPA. The same three predictors precipitated from the analysis at five of the six campuses. They were High School GPA (an index of prior knowledge), STEP Reading (a measure of ability learn from text), and CSSM: Attitudes (confidence and morale in learning or motivation for learning). When the CSSM attitudes test was combined with High School GPA and the SAT (Verbal and Math), it also boosted the prediction of

freshman GPA to .43. Therefore, we recommended that measures of ability to learn from text (STEP: Reading 1A), motivation to learn (CSSM Attitudes) and an index of prior knowledge (HS GPA) be used as alternative criteria to aptitude tests (SAT Verbal and Math) and HS GPA for admission to both systems of higher education. The University of California, Los Angeles (UCLA) has already adopted this recommendation. Thus, we satisfied the first purpose: ability to learn from text is predictive of achievement at the University level.

Contrastive Analysis of Ability to Learn from Text

A contrastive analysis of students high and low on ability to learn from text revealed that they differed in two ways: (1) the high students had greater depth in vocabulary, that is, they knew meanings of words for more abstract ideas and (2) they could solve more multiple step questions on the STEP test of reading comprehension. But there were no differences between the two groups on single step questions. Both single and multiple step questions tap the same reasoning processes such as memory, inference, interpretation, generalization, and evaluation. Therefore, the differences between the two groups were not in their reasoning processes, but in their abilities to use them sequentially to solve a complex problem. These abilities also interact with affective components, as indicated by assessment of confidence and morale (CSMS Attitudes). In short, college students who are better at learning from text can construct meanings for more abstract ideas and have the confidence and morale in their ability to learn from text to enable them to progress

systematically through a sequence of reasoning processes for solving complex verbal tasks (Singer and Bean, 1982b).

The second purpose of our four year project, which cost a total of some $220,000, was to demonstrate ways of improving college students' ability to learn from text.[7] In the process, we anticipated we might discover predictors that would boost our multiple prediction of achievement higher than the correlation of .43 that we had obtained in satisfying our first purpose. We suspected that these predictors might be in specific classroom factors. Therefore, we began to conduct experimental investigations in freshman classes.

To guide our investigation, we used the instructional model, depicted in a previous section in Figure 1. It is a modification of models described elsewhere (Rothkopf, 1982; Singer, 1982). The model indicates that achievement as assessed by a test (final examination) in a particular classroom is a function of (1) student characteristics, including prior knowledge, attitudes towards learning, and ability to learn from text; (2) text characteristics (presented either in printed or lecture form); (3) the goals of the course as defined by tests constructed by the instructor; (4) teaching strategies used by the instructor that affect and interact with each of the preceding components; and (5) ecological factors that affect learning in the classroom, such as having full-time or only part-time to devote to the demands of a particular course.

We presume that coherence among all the factors in our instructional model will yield the highest achievement in a class. We

have so far investigated only student characteristics, described above, instructional strategies, and text characteristics. Experimental research on instructional strategies, reported in detail in four volumes (Singer & Bean 1982a,b; 1983, 1984) and several journal articles (Bean, Singer, Sorter, & Frazee, 1982, 1983; Bean & Singer, 1983) have included teaching high school students in a history class a sequence of ways of learning from text, such as use of summarization rules and their graphic organizers (see previous section on an Evolutionary Model); inserting instructor-posed questions into a botany textbook; having sociology students learn to map ideas in their texts; and training psychology students to comprehend and retrieve concepts by relating them to their current experience.

Our strategies have been (1) a combination of improving students' resources and use of their resources in interacting with text, (2) modifying texts to make them more friendly (Singer, 1983, in press), and (3) teaching instructors how to teach students to learn from text and how to select friendly texts or make their texts friendlier.

Texts can be appraised as to the degree that they alone can facilitate learning. But texts also operate in a dynamic classroom situation that affects their friendliness; for example, students can learn to modify their texts by constructing summaries or graphic organizers for the text, or the instructor can make a text friendlier as a result of lecturing on a particular chapter or section of the text. Moreover, a text may be used in a particular course that is part of a curricular sequence. If the text occurs at an appropriate

position in the sequence, then students are likely to be able to use prior knowledge for assimilating information presented in a text (Singer, in preparation). Investigations of such text characteristics and modifications are currently underway; the results will be reported at a conference to be held in October 1984 (Singer and Bean, 1984).

Dissemination

In the process of experimenting in freshman classes, our campus coordinators, who are professors of education with a specialty in reading and learning from text, collaborated with professors of freshman classes, such as history, psychology, sociology, botany, and English. As a result, the content area professors acquired knowledge on how to teach their students to learn from text. Dissemination also occurred in the form of conferences, monographs, and technical reports. Abstracts of research on learning from text done by other investigators were culled from various journals and placed in a report entitled LFT Abstracts. The LFT Technical Reports and Abstracts were mailed some 3 to 4 times per year to some 120 professors and researchers in the UC and CSU systems.

Summary and Conclusions

Four models for teaching students how to interact more effectively with text at the junior high, high school and university levels were reviewed. The purpose of all the models, whether supported by federal, district, or university funds, was to improve student achievement. Each model emphasized one or more of the following classroom components and their interactions:

student resources, text characteristics, tests or course goals, and instructional strategies. All four models were successful in some ways, as indicated by interviews, rating scales, criterion-referenced tests, and assessment measures in true experimental designs. They all have in common a long time duration. This time requirement is necessary because instructors need the time to learn how to comprehend and incorporate into their instruction the complex components in our instructional model and for students to acquire, habituate, and use instructional strategies for learning from text.

As a final word, we want to emphasize these points; (1) all the factors in our instructional model interact; (2) the learning from text strategies are complex and therefore require a considerable number of sessions for students to learn them to a level of proficiency where they are likely to make a difference in achievement (Singer and Donlan, 1982); (3) all students have to learn them, not just low achievers; and (4) each student must learn how to learn from text at a level appropriate to each stage of reading development, starting with learning how to read in primary grades, developing automaticity in acquisition skills in the intermediate grades, beginning to learn how to learn from text in content areas in the intermediate grades, going on to more advanced levels of ability to learn from text in high school, and finally progressing into ability to learn from text at a college or university level of comprehension (Chall, 1983; Singer, 1984); in short, each level has to provide its own instruction for teaching students to progress to increasingly higher levels in ability to learn from text.

Notes

1. The effects of the program were also spread through the use of video-tapes presented to local groups, a University Extension course entitled "Project Literacy," a two-day symposium conducted in cooperation with Professor Harold Herber and his Syracuse Reading Project at the International Reading Association's Annual Convention held in 1971 in Atlantic City, and a symposium presented at the 1971 Annual Conference of the California Reading Association held in San Francisco. Sylvia Cherry, one of the teaching fellows in the project, participated in this presentation.

2. These units, prepared under the direction of Dr. Robin McKeown in his curriculum class at the University of California, Riverside, are entitled Power, Conflict, Self-Concept, Courage, Pollution, Greatness and American Dream. For a summary of the unit on the American Dream, see Reading and Learning from Text (Singer & Donlan, 1980).

3. These materials are now housed in the University's library where they are available for loan to any teacher in the University's service area.

4. These tests are published by the California Test Bureau. Monterey, California: McGraw-Hill.

5. The dissemination objective of the program was also realized through the positions obtained by our reading content specialists. Upon completion of the project half the graduates immediately gained positions related to their training and experience. Anthony Bechtold became a reading consultant in Poway School District, Poway,

California; Richard Zimmerman served as a reading specialist at Moreno Valley High School, Sunnymead, California; Christina Guitierrez and Jean Fruehan became chairman of their respective social studies and English departments in Riverside and San Bernardino junior high schools; Margaret Minor was employed in a newly created position as the reading consultant in the Riverside junior high school where she had previously taught. Bonnie Bauman returned to her high school and Vaughan Hudson continued on in her junior high as an English teacher. Dale Johnson and David Kahl, on sabbatical leave from their high schools in Oceanside, California and Erie, Pennyslvania respectively, had to return to them. Patsy Miller took the year off from teaching. Sylvia Cherry accepted a position as a part-time member of the University of California, Riverside's supervisory staff in teacher education and part-time teacher in the junior high school in Riverside where she had taught before entering the program.

6. Campus coordinators were UC Professors Julius Sassenrath, Davis; Robert B. Ruddell, assisted by Mr. Owen Boyle, Berkeley; John McNeil, UCLA; Dan Donlan and Ovid Tzeng, Riverside; and CSU Professors Ruth Hartley, Sacramento; John Tibbetts and James Duggins, San Francisco; Deborah Hancock, Bakersfield; Thomas Bean, Fullerton; Alan Crawford, Los Angeles; James Flood and Diane Lapp, San Diego; and Peggy Atwell and Adrian Klein, San Bernardino. Mrs. Betty Levinson, Academic Research Coordinator, UCLA, conducted an interview study on learning from text.

7. The high school phase of our project, described in our evoluationary model, tried to determine whether our instructional

model would develop students to a higher level of preparation for university instruction. Dr. Thomas Bean, CSU Fullerton and Associate Director of the Project, had primary responsibility for this phase of the project.

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